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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

10/650,505

08/27/2003

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EXAMINER

OLSEN, ALLAN W

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

07/01/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |                                       |  |
|------------------------------|--------------------------------------|---------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/650,505 | <b>Applicant(s)</b><br>INOMATA ET AL. |  |
|                              | <b>Examiner</b><br>Allan Olsen       | <b>Art Unit</b><br>1792               |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 December 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 13-15, 18-20, 23-37 and 39-41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 13-15, 18-20, 23-37 and 39-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>8/15; 9/18; 10/10</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 13-15, 18-20, 23-37 and 39-41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

To each independent claim the phrase, “with a distance”, has been added such that each independent claim recites “...covering said substrate with a plate with a distance...” However, the “distance” is not attributed to anything specific. As such it is not clear if the “distance” is a reference to the amount of space that remains between the substrate and the plate after the plate covers the substrate, or if the “distance” refers to a distance across the plate (i.e., dimension), or if the “distance” is a measure of the lateral extent to which the substrate has been covered or some other “distance”.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 13, 14, 18, 23-30, 32-36, 39 and 41 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 2000-261008 (hereinafter, Katsuhiro).**

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Katsuhiro teaches roughening the surface of a solar cell substrate by a reactive ion etching method wherein a metallic mesh shadow mask is placed above a silicon substrate to be etched (see figure 8 and [0020]-[0022], and [0045]). Katsuhiro teaches that the mesh allows one to control the formation of needle-like black silicon (see [0046]). Katsuhiro teaches using a mask having 30 micron openings in a pitch of about 60 microns, which corresponds to an open area ratio of about 25% (see [0054]).

The claimed cleaning of the mesh is considered to be an inherent feature of Katsuhiro.

With respect to the limitation of claim 28, the mesh of Katsuhiro is considered to read on the stacked obstacles because the weave of a Katsuhiro's screen comprises long obstacles that are aligned in different directions, that alternately change between the top and bottom positions in a two layer stack.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims 15, 31, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Katsuhiro.**

The above noted teaching of Katsuhiro is herein relied upon.

Katsuhiro does not teach the distance between the screen and substrate and Katsuhiro does not teach the using a screen comprising aluminum.

It would have been obvious to one skilled in the art to optimize the spacing between the Katsuhiro's screen and substrate to maximize the formation of amount of black silicon.

It would have been obvious to one skilled in the art to use a screen comprising aluminum because Katsuhiro teaches using a stainless steel mesh and the examiner takes Official Notice that it is well known that increasing the aluminum content of stainless steel increases the steel's resistance to oxidation.

### ***Response to Arguments***

Applicant's arguments have been considered. With regards to applicant's arguments pertaining to the rejections under 35 USC 112, applicant's arguments are persuasive. However, on a different basis, the claims are again rejected under 35 USC 112 2<sup>nd</sup>. With respect to applicant's arguments pertaining to the art rejection s based upon Katsuhiro (JP-2000-261008), applicant's arguments are not persuasive.

Applicant argues:

*that Katsuhiro cannot anticipate or render claim 13 obvious, because Katsuhiro fails to teach or suggest "covering said substrate with a plate with a distance, wherein said plate comprises an obstacle with a plurality of obstacle forming members that inhibit a part of gas and plasma from passing through said plate;*

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*and forming textures on a surface of said substrate by using residues being chiefly composed of components of said substrate as an etching mask."*  
*Katsuhiro teaches roughening the surface of a substrate by an etching method, wherein the mask screen is placed above a polycrystal silicon substrate. As part of this etching method, Katsuhiro teaches sticking a mask screen 15, which has fine openings, over a polycrystal silicon substrate 1 and performing the etching of a surface of the substrate 1 by the mask screen 15 (Katsuhiro, paragraph [0045]).*

However, the examiner sees no distinction between Katsuhiro's method, as outlined above, and applicant's claimed method. Specifically, as noted by applicant, Katsuhiro teaches texturing the surface of a solar cell substrate by "sticking a mask screen 15, which has fine openings, over a polycrystal silicon substrate 1 and performing the etching of a surface of the substrate 1 by the mask screen 15 (Katsuhiro, paragraph [0045])." How is this different from placing a substrate for a solar cell on an RF electrode inside a chamber and covering said substrate with a plate with a distance, wherein said plate comprises an obstacle with a plurality of obstacle forming members that inhibit a part of gas and plasma from passing through said plate; and forming textures on a surface of said substrate by using residues being chiefly composed of components of said substrate as an etching mask?

If applicant is relying on the newly recited "with a distance" with an understanding that this means having a distance between the plate and substrate, the examiner notes that Katsuhiro merely discloses arranging the mask and does not appear to address the relative vertical displacement. However, even if Katsuhiro is read as teaching to place

the mask directly upon the substrate, the examiner contends that a minute distance or even a distance of zero units still reads upon the recited "with a distance".

Applicant additionally argues:

*According to Katsuhiro's method, by sticking the mask screen 15 all over the surface of the silicon substrate 1 and performing the RIE etching method, "not only uniform irregularity is obtained, but also reinforcement with sufficient N+ diffusion layer formed on it is obtained. This is because generating needlelike black silicon is much controlled comparing with the case where there is not a mask screen" (Katsuhiro, paragraph [0046]).*

*Stated differently, in the case where a mask screen is not provided, the needlelike black silicon is considerably generated. As a result, neither uniform irregularity nor reinforcement in the N+ diffusion layer is obtained.*

*Obtaining the distance between the screen and substrate, as the Office suggests, causes the above-mentioned problems. And this would be contrary to Katsuhiro's purpose. Thus, Applicant respectfully submits that a person of ordinary skill in the art would be discouraged from employing the arrangement discussed above.*

With respect to applicant's "stated differently" remark, the examiner does not know on what basis applicant supports this alternative statement which suggests that Katsuhiro's "controlled production" of needlelike black silicon is contrasted by needlelike silicon being "considerably generated when a mask is not used. Why does applicant contrast Katsuhiro's controlled production with considerable generation? Furthermore, applicant states that, as a result of not using a mask, neither uniform irregularity nor reinforcement in the N+ diffusion layer is obtained. Therefore, in accordance with Katsuhiro's teaching, it follows, that by using a mask, uniform irregularity and reinforcement in the N+ diffusion layer is obtained.

Stated differently, by reactive ion etching through the mask of Katsuhiro, a solar cell substrate is provided with a (uniform) surface texture as is required by applicant's claim.

Additionally, applicant argues:

*Furthermore, Katsuhiro's mask screen is a "mask" that is not a plate to confine etching residues such as that of the present invention. If it were arranged with a distance between the mask screen and substrate, the mask screen would not work as a mask.*

The examiner notes that Katsuhiro's screen mask appears to be essentially the same as applicant's (screen) mask. Therefore, the two masks would be expected to produce similar results through similar mechanisms.

### ***Allowable Subject Matter***

Claim 20 (and dependent claim 19) would be allowable if rewritten or amended to overcome the rejection under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of



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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allan Olsen whose telephone number is 571-272-1441. The examiner can normally be reached on M, W and F: 1-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Allan Olsen/  
Primary Examiner, Art Unit 1792